MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

EMM 216: WORKSHOP PROCESSES & PRACTICE III

DATE: 22/5/2019 **TIME: 8.30-10.30 AM**

INSTRUCTIONS

i) This examination contains **FIVE** questions.
ii) You are required to answer **THREE** questions only
iii) Question **ONE** is compulsory
iv) Attempt any other **TWO** questions.
v) Questions **ONE** carries **30 marks** and the **others** carry **20 marks** each.

QUESTION ONE (30 MARKS)

a) Using neat sketches, illustrate **THREE** basic types of oxyacetylene flames used in oxyfuel-gas welding and cutting operations. (6 marks)

b) Using neat sketches describe the following milling operations. (4 marks)

i) Plain or slab milling.

ii) Angular milling.

c) Calculate the cutting time for cutting 150 mm long keyway using HSS end mill of 20 mm diameter having four cutting teeth. The depth of keyway is 4.2 mm. Feed per tooth is 0.1 mm and cutting speed is 38 m/min. Assume the approach and overtravel distance as half of the diameter of the cutter and a depth of 4.2 mm can be cut in one pass. (4 marks)

d) Highlight **SIX** advantages of grinding process over other cutting processes. (6 marks)

e) Enumerate **FOUR** characteristics of a grinding wheel. (2 marks)

f) Explain the principle of operation of spot welding using a neat sketch. (6 marks)

g) List **FOUR** advantages of spot welding process. (2 marks)

QUESTION TWO (20 MARKS)

a) Using a neat sketch describe any **FOUR** main parts of a horizontal milling machine. (8 marks)

b) Given the following sets of index plates shown below for milling operation, obtain the indexing for 137 divisions. (6 marks)

i. Plate No. 1: 15, 16, 17, 18, 19, 20 holes.

ii. Plate No. 2: 21, 23, 27, 29, 31, 33 holes.

iii. Plate No. 3: 37, 39, 41, 43, 47, 49 holes.

c) Enumerate **SIX** advantages of gear hobbing as compared to gear milling. (6 marks)

QUESTION THREE (20 MARKS)

a) Describe the working principle of a plain cylindrical grinder using a neat sketch. (8 marks)

b) Enumerate **SIX** special features of grinding process. (6 marks)

c) List and explain **TWO** artificial abrasive materials used in grinding and polishing operations (6 marks)

QUESTION FOUR (20 MARKS)

a) Describe **TWO** types of milling processes using neat sketches (4 marks)

b) List **FOUR** broad classifications of milling machines (2 marks)

c) State **FOUR** applications of gas welding. (4 marks)

d) Explain the working principle of TIG welding process using a neat sketch. (6 marks)

e) Highlight **FOUR** advantages of MIG welding process. (4 marks)

QUESTION FIVE (20 MARKS)

a) Explain the working principle of MIG welding process using a neat sketch. (6 marks)

b) Highlight **FOUR** differences between TIG and MIG welding processes. (4 marks)

c) When milling a slot 20 mm wide by 100 mm long in a rectangular plate 100 mm by 200 mm, the cutting speed = 60 m/min. ;Diameter of end drill = 20 mm ; Number of flutes = 8 ; Feed = 0.01 mm/flute ; Depth of cut = 3 mm. Determine the cutting time for the operation to be completed in a single pass. (6 marks)

d) Define the following terms as applied in machining processes. (4 marks)

i) Milling.

ii) Grinding.

iii) Gang Milling.

iv) Gear hobbing.